```
%%%% KLTBullPortfolioAdvisor
%%%% Source Code
%%%% May 2015 030354Z
```

%% main.m

```
1.
      %initialize
2.
          clear;
3.
          clc;
4.
5.
     %Variables - Risk Free Rate = 1.4%, as of Mar 31, 2015
6.
7.
          RiskFreeRate = .014;
8.
9.
     %Introduction
10.
          intro();
11.
12.
      % Personal Info
13.
          [age,gender,genderName,name]=getPersonalInformation();
14.
          clc;
15.
16.
     % Survey
17.
          [ RiskAversion, highCapPreference ] = survey(gender,age);
18.
19.
     % Fetch ticker data from Yahoo!
20.
          FetchDataFromYahoo;
21.
22.
     % Data Pre-Process
23.
          dataPreprocessing;
24.
25.
     % Optimization
26.
          OptimizationUtility;
27.
28.
     % Display Results
29.
          DisplayResult;
30.
31.
      % Visualization
32.
          DrawFrontierFigure;
33.
          DrawPieChart;
34.
          DrawTrendLine(1200*Eret,1200*Ersk);
35.
36.
     % Final Stage
37.
          thankYou;
          clc;
38.
39.
          clear;
40.
```

# %% intro.m

```
function intro()
1.
     %INTRO Summary of this function goes here
2.
3.
        Detailed explanation goes here
4.
     %Introduction
5.
       fprintf('\n');
fprintf(' 88
fprintf(' 88 8
6.
7.
                      88
                          88
                               8888888
                                           8888888 88
                                                          88 88
                                                                    88
                                                                           \n');
                    88
                                                                           \n');
                                                88 88
                                                          88 88
8.
                          88
                                  88
                                           88
                                                                    88
       fprintf(' 88888
                                                                           \n');
9.
                                  88
                                           8888888 88
                                                          88 88
                          88
                                                                    88
       fprintf('88 88
                                                                           \n');
                                  88
                                           88
                                                 88 88
                                                          88 88
                                                                    88
10.
                          88
       fprintf(' 88
                                  88
                                                                           \n');
11.
                     88
                         88
                                           88
                                                 88 88
                                                          88 88
                                                                    88
       fprintf(' 88
                       88 888888 88
                                           8888888 888888 888888 \n');
12.
       fprintf('\n');
13.
       fprintf('* P o r t f o l i o
14.
                                      Advisor*\n');
       fprintf('\n');
fprintf(' + Introduction\n');
15.
16.
       fprintf('\n');
fprintf(' 0
17.
18.
                    Our group project is an application that designs a\n');
       fprintf(' tailor-made portfolio based on your personal features.\n')
19.
       fprintf(' We provide investment suggestions that will generate the\n');
20.
       fprintf(' most PROFITs with the greatest SECURITY of your\n');
21.
       fprintf(' wealth.\n');
22.
       fprintf('\n');
23.
```

```
fprintf('\n');
fprintf('\n');
24.
25.
       fprintf('\n');
26.
       fprintf('\n');
27.
       fprintf('Press any key to continue...');
28.
29.
       pause;
30.
       clc;
31.
32.
     %About
       33.
       fprintf('\n');
34.
       fprintf('88
                               8888888
35.
                      88
                          88
                                           8888888 88
                                                          88 88
                                                                    88
                                                                            \n');
       fprintf('88 88
                                                                            \n');
36.
                          88
                                  88
                                           88
                                               88 88
                                                          88 88
                                                                    88
37.
       fprintf(' 88888
                          88
                                  88
                                           8888888 88
                                                          88 88
                                                                    88
                                                                            \n');
       fprintf(' 88 88
                                                                            \n');
38.
                          88
                                  88
                                           88
                                                 88 88
                                                          88 88
                                                                    88
       fprintf(' 88
                                                                            \n');
                                                 88 88
39.
                         88
                      88
                                  88
                                           88
                                                          88 88
                                                                    88
                                                                            \n');
       fprintf(' 88
40.
                       88 888888 88
                                           8888888 888888 888888 888888
       fprintf('\n');
41.
       fprintf('* P o r t f o l i o
fprintf('\n');
42.
                                      Advisor*\n');
43.
       fprintf(' + Our Members\n');
44.
       fprintf('\n');
45.
46.
       fprintf('
                                      SID\n');
                  Name
       fprintf('
                                             -\n');
47.
       fprintf('
                                      52637475\n');
48.
                   SHI Beiying
       fprintf('
49.
                   XU Yaohai
                                      53546028\n');
       fprintf('
50.
                                      54017313\n');
                   ZOU Luoyi
                   JIN Luteng
SHI Zhongjie
                                      54018451\n');
51.
       fprintf('
       fprintf('
52.
                                      54018280\n');
       fprintf('\n');
53.
       fprintf('Press any key to continue...');
54.
55.
       pause;
56.
       clc;
57.
58.
     %Hello
59.
       ========= \n'):
       fprintf('\n');
fprintf(' 88
60.
                               8888888
61.
                      88
                          88
                                           8888888 88
                                                          88 88
                                                                    88
                                                                            \n');
       fprintf('88
                                                                            \n');
62.
                     88
                          88
                                  88
                                           88
                                                 88 88
                                                          88 88
                                                                    88
       fprintf(' 88888
                                                                            \n');
63.
                          88
                                  88
                                           8888888 88
                                                          88 88
                                                                    88
       fprintf('88
                                                 88 88
                                                                            \n');
                                  88
64.
                    88
                          88
                                           88
                                                          88 88
                                                                    88
       fprintf(' 88
                                           88
65.
                      88
                          88
                                  88
                                                 88 88
                                                          88 88
                                                                    88
                                                                            \n');
       fprintf('88
                                                                            \n');
                       88 888888 88
                                           8888888 888888
                                                            888888 888888
66.
       fprintf('\n');
67.
       fprintf('* Portfolio Advisor*\n');
68.
       fprintf('\n');
fprintf(' - Hello, World!\n');
69.
70.
       fprintf('\n');
71.
       fprintf('Press any key to continue...');
72.
73.
       pause;
74.
       clc;
75.
76.
     end
77.
```

### %% getPersonalInformation.m

```
1.
     function [age, genderCode,genderName,name]=getPersonalInformation()
2.
     %PERSONAL Summary of this function goes here
3.
     % Detailed explanation goes here
4.
5.
     %Default Value
6.
     age=0;
7.
     gender=8;
8.
9.
     %Age
       fprintf('== Age ======
10.
       fprintf('\n');
11.
       fprintf('* Portfolio Advisor*\n');
12.
       fprintf('\n');
fprintf(' - Would you mind telling me your age?\n');
13.
14.
       fprintf('\n');
15.
```

```
age=input('#');
16.
17.
       clc;
18.
19.
    %Gender
       fprintf('== Gender =======
20.
                                                                ======\n'):
       fprintf('\n');
fprintf('* Portfolio Advisor*\n');
21.
22.
      fprintf('\n');
fprintf(' - How can I call you?\n');
23.
24.
      fprintf('\n');
fprintf(' 1.
25.
26.
                    1. Mr.\n');
       fprintf('
27.
                    8. Ms.\n');
       fprintf('
                    9. Miss.\n');
28.
29.
       fprintf('
                    0. Mrs.\n');
       fprintf('\n');
30.
31.
       fprintf('Kindly enter 1, 8, 9 or 0.\n');
       fprintf('\n');
32.
       genderCode=input('# ');
33.
       gender='1'
34.
35.
           genderName='Mr.';
36.
37.
       if genderCode<5
38.
         gender='1';
39.
         else
40.
         gender='8';
41.
        end
42.
        if genderCode==1
43.
         genderName='Mr.';
44.
        end
45.
        if genderCode==8
46.
         genderName='Ms.';
47.
        end
48.
        if genderCode==9
49.
         genderName='Miss.';
50.
        end
51.
        if genderCode==0
52.
        genderName='Mrs.';
53.
        end
54.
       clc;
55.
    %Name
56.
57.
       fprintf('== Gender =========\n');
       fprintf('\n');
fprintf('* Portfolio Advisor*\n');
58.
59.
       fprintf('\n');
60.
       fprintf(' - How can I call you?\n');
fprintf(' ');
61.
62.
63.
       name=input(strcat(genderName,' '),'s');
64.
       clc;
65.
66.
    end
67.
```

# % survey.m

```
function [ RiskAversion, highCapPreference ] = survey(gender, age)
    %SURVEY: Risk Aversion and Market Preference Survey
        This function outputs user's risk rating and whether the user have
3.
4.
        preference on asset liquidity.
5.
        rate: 1 to 10
    %
6.
7.
    %Survey Intro
8.
      fprintf('== Risk Survey =========
                                                              =======\n');
      fprintf('\n');
fprintf(' 88
9.
                     88
10.
                         88
                               8888888
                                           8888888
                                                                              \n');
                                                    88
                                                           88 88
                                                                     88
      fprintf('88 88
                                                                              \n');
                                                           88 88
11.
                          88
                                  88
                                           88
                                                 88 88
                                                                     88
      fprintf(' 88888
                                                                             \n');
12.
                          88
                                  88
                                           8888888 88
                                                           88 88
                                                                     88
      fprintf(' 88 88
                                                                             \n');
                                                 88 88
13.
                          88
                                  88
                                           88
                                                           88 88
                                                                     88
      fprintf('88
                                                                             \n');
14.
                    88 88
                                  88
                                           88
                                                 88 88
                                                           88 88
                                                                     88
      fprintf(' 88
                      88 888888 88
15.
                                           8888888 888888 888888 888888\n');
      fprintf('\n');
16.
      fprintf('* P o r t f o l i o
17.
                                      Advisor*\n');
```

```
fprintf('\n'); fprintf(' Please take few minutes to answer the follow questions to \n');
18.
19.
      fprintf('help us optimize your portfolio.\n');
20.
      fprintf('\n');
21.
      fprintf('\n');
22.
      fprintf('Press any key to continue...');
23.
24.
      pause;
25.
      clc;
26.
27.
28. %Survey Q1
      fprintf('== Risk Survey #1 ==========\n');
29.
      fprintf('\n');
30.
31.
      fprintf(' 1.How many years of experience do you have in investment?\n');
      fprintf('\n');
32.
33.
      fprintf('
                    A. No Experience\n');
      fprintf('
34.
                    B. < 3 \text{ years} \ ');
      fprintf('
35.
                   C. 3 - 6 years\n');
D. 7 - 10 years\n');
      fprintf('
36.
      fprintf('
37.
                    E. >10 years\n');
      fprintf('\n');
38.
      fprintf('\n');
39.
40.
      Q1=input('( A - E )$ ','s');
41.
      clc;
42.
      switch Q1
          case {'a','A'}
43.
44.
          r1=0;
case {'b'
                     ,'B'}
45.
               r1=2.5;
46.
           case {'c', 'C'}
47.
          r1=5;
case {'d','D'}
48.
49.
50.
              r1=7.5;
51.
           case {'e'
52.
              r1=10;
53.
          otherwise
54.
              r1=5;
55.
      end
56. clc;
57. %Survey Q2
58.
      fprintf('== Risk Survey #2 ==========\n');
59.
      fprintf('\n');
      fprintf(' 2.How many types of investment products below are you \n');
60.
      fprintf(' holding currently?\n');
61.
      fprintf('\n');
62.
63.
      fprintf('

    Cash, deposits, certificate of deposits, capital \n');

      fprintf('
64.
                    protected products\n');
      fprintf('
                    Bonds, bond funds\n');
65.
      fprintf('
66.
                    Foreign currencies, non capital protected currency \n');
      fprintf('
                    linked structured products\n');
67.
68.
      fprintf('

    Stocks, openend funds excluding bond funds & money \n');

      fprintf('
                    market funds, non capital protected equity linked \n');
69.
      fprintf('
                     structured products, investmentlinked insurance plan, \n');
70.
      fprintf('
71.
                    commodities\n');
      fprintf('
72.
                    - Options, futures, warrants\n');
      fprintf('\n');
73.
      fprintf('\n');
74.
      02=input('(1-5)#','s');
75.
76.
      clc;
77.
      switch Q2
          case {'0'}
78.
79.
              r2=0;
           case {'1'}
80.
81.
              r2=2;
           case {'2'}
82.
83.
              r2=4;
           case {'3'}
84.
85.
              r2=6;
          case {'4'}
86.
87.
              r2=8;
          case {'5'}
88.
89.
               r2=10;
```

```
90.
          otherwise
91.
               r2=5;
92.
      end
93. clc;
94. %Survey Q3
      fprintf('== Risk Survey #3 ==========
95.
      fprintf('\n');
96.
      fprintf(' 3.In order to achieve your expected returns, which state- \n');
97.
      fprintf('
98.
                 ment best describes the degree of losses you are willing \n');
      fprintf('
99.
                  to take?\n');
      fprintf('\n');
fprintf(' A
100.
101.
                   A.I am willing to accept minimal amount of capital loss.\n');
      fprintf('
102.
                    B.I am willing to accept moderate capital loss.\n');
103.
      fprintf('
                    C.I am willing to accept high capital loss. \n');
      fprintf('\n');
104.
      fprintf('\n');
Q3=input('( A - C )$ ','s');
105.
106.
107.
      clc;
108.
109.
      switch Q3
          case {'a','A'}
110.
          r3=0;
case {'b','B'}
111.
112.
          r3=5;
case {'c','C'}
113.
114.
115.
              r3=10;
116.
          otherwise
117.
               r3=5;
118.
      end
119.
      clc:
120. %Survey Q4
      fprintf('== Risk Survey #4 ========\n');
121.
      fprintf('\n');
122.
      fprintf(' 4.0n the whole, which of the following best describes your\n');
fprintf(' investment objective?\n');
123.
124.
      fprintf('\n');
125.
      fprintf('
126.
                    A.Capital Preservation\n');
      fprintf('
                    B.A Regular Steam Of Stable Income\n');
127.
      fprintf('
                    C.A Combination Of Income And Capital Growth\n');
128.
      fprintf('
129.
                    D.Achieve Substantial Long Term Capital Growth\n');
130.
      fprintf('
                    E.High Capital Appreciation\n');
      fprintf('\n');
131.
      fprintf('\n');
132.
      04=input('( A - E )$ ','s');
133.
134.
      clc;
135.
136.
      switch Q4
          case {'a','A'}
137.
          r4=0;
case {'b','B'}
138.
139.
140.
              r4=2.5;
           case {'c', 'C'}
141.
          r4=5;
case {'d','D'}
142.
143.
144.
              r4=7.5;
145.
          case {'e','E'}
146.
               r4=10;
147.
          otherwise
148.
               r4=5;
149.
      end
150.
      clc;
151.
152. %Survey Q5
      fprintf('== Risk Survey #5 ==========\n');
153.
      fprintf('\n');
fprintf(' 5.Which of the following portfolio is most attractive to\n');
154.
155.
      fprintf(' you?\n');
156.
      fprintf('\n');
157.
      fprintf('
                    \dot{A}.Portfolio (a) – I am willing to accept a potential \n');
158.
      fprintf('
159.
                     loss of 3% in exchange for 9% potential upside.\n');
160.
      fprintf('
                    B.Portfolio (b) - I am willing to accept a potential \n');
      fprintf('
161.
                     loss of 10% in exchange for 18% potential upside.\n');
```

```
C.Portfolio (c) - I am willing to accept a potential\n');
loss of 15% in exchange for 25% potential upside.\n');
162.
       fprintf('
       fprintf('
163.
       fprintf('
                      D.Portfolio (d) - I am willing to accept a potential\n');
164.
       fprintf('
                       loss of 20% in exchange for 31% potential upside.\n');
165.
       fprintf('
166.
                      E.Portfolio (e) - I am willing to accept a potential\n');
       fprintf('
167.
                       loss of 27% in exchange for 40% potential upside.\n');
       fprintf('\n');
168.
       fprintf('\n');
169.
       Q5=input('(A-E)$','s');
170.
171.
172.
173.
       switch 05
           case {'a','A'}
174.
175.
           r5=0;
case {'b','B'}
176.
           r5=2.5;
case {'c','C'}
r5=5;
case {'d','D'}
r5=7.5;
177.
178.
179.
180.
181.
           case {'e','E'}
182.
183.
                r5=10;
184.
           otherwise
185.
                r5=5;
186.
      end
187.
188.
       clc;
189. %Survey Q6
       fprintf('== Risk Survey #6 =========\n');
190.
       fprintf('\n');
191.
       fprintf(' 6.Compared to others, how do you rate your willingness to \n');
fprintf(' take financial risks?\n');
192.
       fprintf('
193.
       fprintf('\n');
194.
195.
       fprintf('
                      A. Extremely low risk taker.\n');
       fprintf('
196.
                      B. Low risk taker.\n');
      fprintf('
197.
                      C. Average risk taker.\n');
       fprintf('
198.
                      D. High risk taker.\n');
       fprintf('
199.
                      E. Extremely high risk taker.\n');
       fprintf('\n');
200.
       fprintf('\n');
201.
      Q6=input('(A-E)$','s');
202.
203.
204.
       switch Q6
           case {'a','A'}
205.
206.
               r6=0;
           case {'b'
                       'B'}
207.
208.
                r6=2.5;
            case {'c', 'C'}
209.
210.
                r6=5;
            case {'d','D'}
211.
212.
               r6=7.5;
            case {'e', 'E'}
213.
               r6=10;
214.
215.
           otherwise
216.
                r6=5;
217.
       end
218.
       clc:
219.
220.
       rate=0.0+(r1+r2+r3+r4+r5)*0.08+r6*0.6;
221.
222.
223.
224.
225.
226.
227.
228.% Market Cap Preference
229.
230.
       fprintf('== Liquidity Preference ===========\n');
       fprintf('\n');
fprintf(' Generally, stocks with high market capitalization have low\n');
fprintf(' liquidity risk and low potential return, and vice versa.\n');
231.
232.
233.
```

```
234.
      fprintf('
                  In order to achieve your investment objectives, which of \n');
       fprintf(' the following statement best describes your style?\n');
235.
      fprintf('\n');
236.
      fprintf('
237.
                    A.I prefer high potential return and high liquidity\n');
      fprintf('
238.
                     risks. \n');
       fprintf('
239.
                    B.I prefer low liquidity risk and low potential return. \n');
      fprintf('
240.
                    C.I don''t have preference on stock''s market cap.\n');
      fprintf('\n');
241.
242.
      MCP=input('(A-C)$','s');
243.
244.
245.
      switch MCP
           case {'a','A'}
246.
               highCapPreference=-1;
247.
248.
           case {'b', 'B'}
249.
               highCapPreference=1;
250.
           case {'c',
                      'C'}
251.
               highCapPreference=0;
252.
           otherwise
253.
               highCapPreference=0;
254.
      end
255.
256.
      clc;
257.
258. %highCapPreference
259.
260.
261.
262.%Survey Result
      fprintf('== Risk Survey Result =========
263.
                                                                 =======\n'):
      fprintf('\n');
264.
265.
      fprintf('
                        YYY
                              YYY
                                    0000000
                                               HIIII
                                                     HIIII
                                                          RRRRRRR
                                                                      \n');
                         YYY YYY
      fprintf('
266.
                                   000
                                          000
                                               UUU
                                                     UUU
                                                          RRR
                                                                 RRR\n');
      fprintf('
                                                                 RRR\n');
                          YYYYY
267.
                                   000
                                               UUU
                                                     UUU
                                          000
                                                           RRR
      fprintf('
                                                           RRRRRRRRRRR\n');
268.
                           YYY
                                   000
                                          000
                                               UUU
                                                     UUU
      fprintf('
269.
                           YYY
                                   000
                                          000
                                               UUU
                                                     UUU
                                                          RRR
                                                                 RRR\n');
270.
                           YYY
                                    0000000
                                                UUUUUUU
                                                           RRR
                                                                  RRR\n');
      fprintf(
       fprintf('\n');
271.
      fprintf('RRRRRR
272.
                           EEEEEEEE
                                       SSSSSS
                                                  UUU
                                                        UUU LLL
                                                                     TTTTTTTT\n');
273.
      fprintf('RR
                      RR
                          EEE
                                      SS
                                             SSS
                                                  UUU
                                                         UUU
                                                             LLL
                                                                        TTT\n');
      fprintf('RR
                                       SSSS
                                                                        TTT\n');
274.
                      RR
                                                  UUU
                                                        UUU
                          EEEEEEEE
                                                              LLL
275.
      fprintf('RRRRRRR
                           EEE
                                           SSSS
                                                  UUU
                                                         UUU
                                                              LLL
                                                                        TTT\n');
      fprintf('RR
                                                                        TTT\n');
276.
                                      SSS
                                              SS
                                                        UUU
                      RR
                          EEE
                                                  UUU
                                                              LLL
277.
      fprintf('RR
                       RR EEEEEEEE
                                        SSSSSS
                                                   UUUUUUU
                                                              LLLLLLL TTT\n');
      fprintf('\n');
278.
279.
      fprintf('Your risk tolerance rating is:%.1f\n',rate);
      fprintf('\n');
280.
      fprintf('\n');
281.
282.
      fprintf('Press any key to continue...');
283.
      pause;
284.
      clc;
285.
286. RiskAversion = 4.0 - rate / 5.0;
287.
288.%Adjust gender difference
289 if(gender \sim = 1)
290.
        RiskAversion = 2+sqrt((RiskAversion-2)*2);
291. end
292.
293.%Adjust age difference
294. RiskAversion = RiskAversion + 0.01 * age;
295.
296 end
297.
```

### %% FetchDataFromYahoo.m

```
1. clc;
2.
3. tickinperiod=0;
4.
5. SamplePeriod='d';% y m w d
```

```
6.
    DateLength=90;
7.
    [ticker tickername]=getStockSet(highCapPreference);
8.
9.
    % Fetch ticker data from Yahoo
10. for(i=1:length(ticker))
11.
        try
12.
13.
                 data=fetch(yahoo,ticker(i),'Adj Close',now-
    DateLength, now, SamplePeriod);
14.
                 Stock(i).name=ticker(i);
15.
                 Stock(i).number=(ticker(i));
                 Stock(i).price=flipud(data);%Now->Old => Old to Now.
16.
17.
                 Stock(i).returns=price2ret(Stock(i).price(:,2),Stock(i).price(:,
    1))*22; %Daily Return Rate. convert to annual \sim returns*365
            catch %IF DON'T HAVE DATA FETCH TOOLBOX
18.
19.
                 data=get_yahoo_stockdata2(ticker{i},now-DateLength,now,SamplePeriod,
    1);
20.
                 data=[datenum(data.Date) data.AdjClose];
21.
                 Stock(i).name=ticker(i);
22.
                 Stock(i).number=(ticker(i));
23.
                 Stock(i).price=data;
24.
                 Stock(i).returns=price2ret(Stock(i).price(:,2),Stock(i).price(:,
    1))*22; %Daily Return Rate. convert to annual ~ returns*365
25.
          end
26.
                %Progress Bar
27.
                 fetchProgress=(60*i/(1.0*length(ticker)));
28.
                 clc;
29.
                 fprintf('\n');
      fprintf('Downloading data from Yahoo!...\n');
30.
      fprintf('\n');
31.
      fprintf('\n');
32.
                  ');
      fprintf('
33.
34.
                 for(j=1:60)
35.
                     if(j<=fetchProgress)</pre>
36.
                         fprintf('>');
37.
                     else
                         fprintf('-');
38.
39.
                     end
40.
                 end
41.
42.
        if(length(Stock(i).price)>tickinperiod)
43.
            tickinperiod=length(Stock(i).price);
44.
        end
45.
46.
        catch
47.
48.
        end
49.
50. end
51.
52. % exclude the ticker that has stopped trading during the sample period.
53.
```

### % getStockSet.m

```
function [result,tickername]=getStockSet(highCapPreference)
2.
3.
    ticker=struct('number',0,'name','','sector','');
    [tno,tnm,tsc,cap] = importCSV('HKEquity.csv');
4.
5.
6.
    stockAmount=length(tno);
7.
8.
    for(i=1:stockAmount)
9.
    ticker(i).number=tno(i);ticker(i).name=tnm(i);ticker(i).sector=tsc(i);ticker(i).ca
    p=cap(i);
10. end
11.
12. screenedTicker=[];
13.
14. for(i=1:stockAmount)
        switch highCapPreference
```

```
16.
             case -1
17.
                 if(ticker(i).cap<1E9)
18.
                    screenedTicker=[screenedTicker; ticker(i)];
19.
20.
                 end
21.
             case 1
22.
                 if(ticker(i).cap>=1E9)
23.
                    screenedTicker=[screenedTicker; ticker(i)];
24.
                 end
25.
             otherwise
26.
                    screenedTicker=[screenedTicker; ticker(i)];
27.
        end
28. end
29 ticker=screenedTicker;
30. stockAmount=length([ticker.cap]);
31. clc;
32.
33. %
34. secCount=1;
35. secName(1)=ticker(1).sector;
36. secNum(1)=0;
37. for(i=1:stockAmount)
38.
39.
         if(strcmp(ticker(i).sector,secName(secCount))~=1)
40.
             secCount=secCount+1;
41.
             secName(secCount)=ticker(i).sector;
42.
             secNum(secCount)=0;
43.
        end
44.
             secNum(secCount)=secNum(secCount)+1;
45. end
46. clc;
47.
48. Number=[1:secCount]';
49. SectorName=secName';
50. StockCount=secNum';
51. sector=table(Number, SectorName, StockCount);
52.
53.
54. fin=0;
55. SelectedSectorNumber=[];clc
56.
57. % Select Sector Number 58. while (fin==0)
59. fprintf('
                  <strong>Select Your Favorite Sector</strong>\n');
      fprintf('\n');
60.
61.
      fprintf('');
62 disp(sector);
63. display(SelectedSectorNumber);
64. i=input('Enter the number(1,2,etc...) before the sector name to select\n');
65.
      fprintf('Press <strong>ENTER</strong> if finished. > ','s')
66. clc;
67. if(str2double(i)>=0)
68.
        if(str2double(i)<=41)
69.
             SelectedSectorNumber=[ SelectedSectorNumber str2num(i)];
70.
        else
71.
             fin=1;
72.
        end
73. else
         fin=1;
74.
75. end
76.
77. clc;
78. end
79.
80. SelectedSectorNumber=unique(SelectedSectorNumber);
81.
82. SelectedTickerNo=[];
83.
84.
85. tickername={''};
86. %string TickerName;
```

```
88.
89.
90.
91.
92. for(i=1:stockAmount)
93.
          for(j=1:length(SelectedSectorNumber))
94.
              if (strcmp(ticker(i).sector,SectorName(SelectedSectorNumber(j))))
    SelectedTickerNo(length(SelectedTickerNo)+1)=ticker(i).number;
95.
96.
                   tickername(length(SelectedTickerNo))=ticker(i).name;
97.
              end
98.
         end
99 end
100.
101. SelectedTickerName=cell(length(SelectedTickerNo), 1);
102.
103.% Get Stock Name in Selected Industries.
105. for(i=1:length(SelectedTickerNo))
         SelectedTickerName(i)={strcat(num2str(SelectedTickerNo(i)),'.HK')};
106.
107.
          for(j=length(SelectedTickerName{i})+1:7)
108.
              SelectedTickerName(i)=strcat('0',SelectedTickerName(i));
109.
110.
111.
112. end
113.
          result=SelectedTickerName;
114.
115. end
116.
```

### %% importCSV.m - Generated by MATLAB

```
function [Ticker,Name,Sector,Cap] = importCSV(filename, startRow, endRow)
2.
    %IMPORTFILE Import numeric data from a text file as column vectors.
        [VARNAME1, CALC, AEROSPACEDEFENSE, VARNAME4, VARNAME5] =
3.
4.
    %
        IMPORTFILE(FILENAME) Reads data from text file FILENAME for the default
5.
    %
        selection.
6.
    %
7.
    %
        [VARNAME1, CALC, AEROSPACEDEFENSE, VARNAME4, VARNAME5] =
8.
        IMPORTFILE(FILENAME, STARTROW, ENDROW) Reads data from rows STARTROW
    %
9.
        through ENDROW of text file FILENAME.
10. %
11. % Example:
12. %
        [VarName1, CALC, AerospaceDefense, VarName4, VarName5] =
13. %
        importfile('HKEquity.csv',1, 1820);
14. %
15. %
         See also TEXTSCAN.
16.
17. % Auto-generated by MATLAB on 2015/04/26 18:34:09
18.
19. % Initialize variables.
20. delimiter = ',';
21. if nargin<=2
22.
        startRow = 1;
23.
        endRow = inf;
24 end
25.
26. % Read columns of data as strings:
27. % For more information, see the TEXTSCAN documentation.
28. formatSpec = '%s%s%s%s%s%s[^\n');
      fprintf('\r]';
29.
30.
31. % Open the text file.
32. fileID = fopen(filename,'r');
33.
34. % Read columns of data according to format string.
35. % This call is based on the structure of the file used to generate this
36. % code. If an error occurs for a different file, try regenerating the code
37. % from the Import Tool.
39. for block=2:length(startRow)
```

```
40.
         frewind(fileID);
    dataArrayBlock = textscan(fileID, formatSpec, endRow(block)-startRow(block)+1,
'Delimiter', delimiter, 'HeaderLines', startRow(block)-1, 'ReturnOnError', false);
41.
42.
         for col=1:length(dataArray)
43.
             dataArray{col} = [dataArray{col};dataArrayBlock{col}];
44.
        end
45. end
46.
47. % Close the text file.
48. fclose(fileID);
49.
50. % Convert the contents of columns containing numeric strings to numbers.
51. % Replace non-numeric strings with NaN.
52. raw = repmat({''},length(dataArray{1}),length(dataArray)-1);
53. for col=1:length(dataArray)-1
54.
         raw(1:length(dataArray{col}),col) = dataArray{col};
55. end
56. numericData = NaN(size(dataArray{1},1),size(dataArray,2));
57.
58. for col=[1,4]
59.
        % Converts strings in the input cell array to numbers. Replaced non-numeric
60.
        % strings with NaN.
61.
        rawData = dataArray{col};
62.
         for row=1:size(rawData, 1);
63.
             % Create a regular expression to detect and remove non-numeric prefixes
    and
    64.
65.
    <suffix>.*)';
66.
            try
67.
                 result = regexp(rawData{row}, regexstr, 'names');
68.
                 numbers = result.numbers;
69.
70.
                 % Detected commas in non-thousand locations.
71.
                 invalidThousandsSeparator = false;
                 if any(numbers==',');
72.
73.
                     thousandsRegExp = '^d+?(\,\d{3})*\.\{0,1\}\d*$';
74.
                     if isempty(regexp(thousandsRegExp, ',', 'once'));
75.
                         numbers = NaN;
76.
                         invalidThousandsSeparator = true;
77.
                     end
78.
                 end
79.
                 % Convert numeric strings to numbers.
80.
                 if ~invalidThousandsSeparator;
81.
                     numbers = textscan(strrep(numbers, ',', ''), '%f');
                     numericData(row, col) = numbers{1};
raw{row, col} = numbers{1};
82.
83.
84.
                 end
85.
             catch me
86.
             end
87.
        end
88 end
89.
90.
91. % Split data into numeric and cell columns.
92. rawNumericColumns = raw(:, [1,4]);
93. rawCellColumns = raw(:, [2,3]);
94.
95.
96. % Replace non-numeric cells with NaN
97. R = cellfun(@(x) ~isnumeric(x) && ~islogical(x),rawNumericColumns); % Find non-
    numeric cells
98. rawNumericColumns(R) = {NaN}; % Replace non-numeric cells
99.
100. % Allocate imported array to column variable names
101. Ticker = cell2mat(rawNumericColumns(:, 1));
102.Name = rawCellColumns(:, 1);
103.Sector = rawCellColumns(:, 2);
104. Cap = cell2mat(rawNumericColumns(:, 2));
105.
```

#### %% dataPreprocessing.m

```
1.
    i=1;
2.
3.
         while(i<=length(Stock))</pre>
4.
             if(length(Stock(i).price)<tickinperiod)</pre>
5.
                 Stock(i)=[];
6.
                 ticker(i)=[];
7.
                 tickername(i)=[];
8.
                 i=i-1;
9.
             end
10.
             i=i+1:
11.
         end
12.
13. for(i=1:length(ticker))
14.
         Stock(i).MeanReturns=mean(Stock(i).returns);
15.
         Stock(i).Variance=var(Stock(i).returns);
16.
         Stock(i).StdDev=std(Stock(i).returns);
17.
18. end
19.
         Covariance=cov([Stock.returns]);
20.
         Correlation=corrcoef([Stock.returns]);
21. clc;
22.
```

### %% OptimizationUtility.m

```
1.
    % Optimization Function
3.
   cret=(RiskFreeRate+1)^(1/12)-1; %Cash return
4.
    crsk=0; % cash risk=risk free
5. AssetList=[Stock.name];
    p = Portfolio('AssetList', AssetList, 'RiskFreeRate', cret);
p = setAssetMoments(p, [Stock.MeanReturns], [Covariance]);
6.
7.
8.
9.
    ExpReturn = [Stock.MeanReturns];
10.
11. ExpCovariance = [Covariance];
12.
13. NumPorts = 80;
14.
15. [PortRisk, PortReturn, PortWts] = portopt(ExpReturn,...
16. ExpCovariance, NumPorts);
17.
18. BorrowRate = 0.08;
19.
20. %portalloc (PortRisk, PortReturn, PortWts, RisklessRate, BorrowRate,
    RiskAversion);
21.
22. [RiskyRisk, RiskyReturn, RiskyWts, RiskyFraction, OverallRisk, OverallReturn] =
    portalloc (PortRisk, PortReturn, PortWts, RiskFreeRate, BorrowRate, RiskAversion);
23.
24. srsk=RiskyRisk;
25. sret=RiskyReturn;
26. prsk=PortRisk;
27. pret=PortReturn;
28. Ersk=OverallRisk;
29. Eret=OverallReturn;
30.
```

### %% DisplayResult.m

```
1. % DisplayResult
   % Set up a dataset object that contains the portfolio that maximizes the Sharpe
   ratio
   Blotter = dataset({tickername(RiskyWts > 0)', 'Name'},{round(100*RiskyWts(RiskyWts
3.
   4.
                                                       ======\n');
     fprintf('\n');
5.
     fprintf('88
                                                                  \n');
                          8888888
                                     8888888 88
6.
                  88
                     88
                                                  88 88
                                                           88
     fprintf(' 88 88
                                     88 88 88
                                                                  \n');
7.
                      88
                             88
                                                  88 88
                                                          88
     fprintf(' 88888
                                                                  \n');
8.
                      88
                             88
                                     8888888 88
                                                  88 88
                                                           88
```

```
fprintf(' 88 88 88
                                     88
                                               88
                                                      88 88
                                                                88 88
                                                                           88
                                                                                    \n');
       fprintf('88
                       88 88
                                                                                    \n');
                                               88
                                                     88 88
                                                                88 88
10.
                                     88
                                                                           88
       fprintf('88
                                               8888888 888888 888888 888888\n');
11.
                        88 888888 88
       fprintf('\n');
12.
       fprintf('* Portfolio Advisor*\n');
13.
       fprintf('\n');
fprintf(' - ');
14.
15.
16. try
17. fprintf('Dear %s,\n');
       fprintf('\n');
fprintf('',strcat(genderName,name));
18.
19.
20 catch
21. end
fprintf(' Given your selected industries, Kowloon Tong Bull has designed\n');
fprintf(' a Portfolio with Maximum Utility for you:\n');
       fprintf('\n');
24.
       fprintf('');
25.
26. fprintf(' We suggest that <strong>%d%</strong> of your wealth should be invested
    in the\n');
  fprintf(' Hong Kong stock market:\n');
27.
       fprintf('\n');
fprintf('', ro
28.
29.
                   round(RiskyFraction*100));
30 disp(Blotter);
31. fprintf('\n');
      fprintf(' while <strong>%d%</strong> should be kept in the risk-less
32.
     investments\n');
33.
       fprintf('(bank deposits or government bonds).\n');
fprintf('\n');
fprintf('', 100-round(RiskyFraction*100));
fprintf('\n');
       fprintf(' Under our suggestion, the performance of your OVERALL\n');
37.
38.
       fprintf(' is as followed:(in annualized term)\n');
       fprintf('');
39.
40. fprintf('\n');
41. fprintf('
41.
                     RETURN\t\t%.2f%%',Eret*1200);
42. fprintf('\n');
       fprintf('
43.
                     RISK(Std Dev)\t%.2f\n');
       fprintf('\n');
44.
       fprintf('',Ersk*12);
45.
46. fprintf('\n');
47.
       fprintf('Press enter to view detailed portfolio analysis');
48. pause;
49.
50.
51.
52. %Ersk=OverallRisk;
53. %Eret=OverallReturn;
54.
```

# % DrawFrontier.m

```
%DrawFrontierFigure
2.
    clf;
3.
     plot([crsk,srsk]*1200,
     [cret,sret]*1200,'g',prsk*1200,pret*1200,'b',srsk*1200,sret*1200,'xr',Ersk*1200,Er
    et*1200,'+k','LineWidth',2,'MarkerSize',10);
xlabel('% Standard Deviation of Returns (Annualized)');
4.
5. ylabel('% Mean of Returns (Annualized)');
6.
     grid on
7.
     print -dpng CapitalAllocation
8.
9.
     pause
10. close
11.
```

# %% DrawPieChart.m

```
tNumber=AssetList(RiskyWts > 0)';
tName=tickername(RiskyWts > 0)';
weights=100*RiskyWts(RiskyWts > 0);

4.
5.
```

```
6. x=[weights];
7. figure;
8. h = pie3(x,1+zeros(1,length(x)),tNumber);
9. labels = tName;
10. legend(labels,'Location','eastoutside','Orientation','vertical')
11.
12. pause;
13. close
14.
```

#### %% DrawTrendLine.m

```
function DrawTrendLine( expret,stddev )
    %DrawTrendLine Summary of this function goes here
2.
3.
        Detailed explanation goes here
4.
5.
    hiret=expret+stddev;
6.
    loret=expret-stddev;
7.
8.
    now=years(0);
9.
    endpoint=years(1);
10.
12. hold on
13.
14. title('Trend Line & Possibility Distribution');
15.
16. labels = {'84.1% Possible Lower', 'Expected Return', '84.1% Possible Higher'};
17. legend(labels, 'Location', 'north', 'Orientation', 'vertical', 'FontSize', 12);
18. ylabel('% Expected Annualized Rate');
19. pause
20. close
21. end
22.
```

# %% thankYou.m

```
1.
    clo
2.
      fprintf('
                                                                         \n');
3.
      fprintf('88
4.
                    88
                        88
                             8888888
                                         8888888
                                                 88
                                                       88 88
                                                                 88
                                                                         \n');
      fprintf(' 88 88
                                                                         \n');
5.
                                              88 88
                                                       88 88
                        88
                                88
                                         88
                                                                 88
                                                                         \n');
      fprintf(' 88888
6.
                        88
                                88
                                         8888888 88
                                                       88 88
                                                                 88
                                                                         \n');
      fprintf(' 88 88
7.
                        88
                                88
                                         88
                                               88 88
                                                       88 88
                                                                 88
      fprintf(' 88
                                                                         \n');
8.
                    88 88
                                88
                                         88
                                               88 88
                                                       88 88
                                                                 88
      fprintf('88
9.
                     88 888888 88
                                         8888888 888888 888888 888888
                                                                         \n');
      fprintf('
                                                                         \n');
10.
                                                                         \n');
      fprintf('* Portfolio Advisor*
11.
      fprintf('
                                                                         \n');
12.
13.
      fprintf(' + Thanks for your trust with KLT Bull Portfolio Advisor!
                                                                         \n');
                                                                         \n');
\n');
      fprintf('
14.
15.
      fprintf('
      fprintf('
                                                                         \n');
16.
                  We sincerely wish you best of the luck with your
      fprintf('
17.
                                                                         \n');
                   investments!
18.
      fprintf('
                                                                         \n');
                                                                         \n');
19.
      fprintf('
                                                                         \n');
      fprintf('
20.
      fprintf('
                                                                         \n');
21.
                                                                         \n');
22.
      fprintf('
      fprintf('
                                                                         \n');
\n');
23.
24.
      fprintf('
      fprintf('
                                                                         \n');
25.
                                                                         \n');
      fprintf('Press any key to exit...
26.
      fprintf('
27.
                                                                         \n');
28. pause
29. %clear
30.
```